PH.D. SYNOPSIS

ON

INTELLECTUAL PROPERTY RIGHTS RELATING TO ARTIFICIAL ORIGINATORS: A CRITICAL STUDY

SUBMITTED TO

HIMACHAL PRADESH NATIONAL LAW UNIVERSITY

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1. Introduction-

Where IP intersects with AI based inventions, there arises many challenges with respect to disclosures, infringements, identification of inventor under patent laws or owner(author) under copyright laws. The conventional IP laws are inadequate to address these issues as the existing laws incapable of keeping at pace with the rising number of complex and varied AI based inventions, here also there is an absence of any specific legislation on this subject in any country which further raises several complicated unanswered issues. As in case of potential protection of works created by autonomous AI-Programs under copyright and patent laws within the prevailing legal framework or existence of specific legislation for the protection of such works by other countries.

Certain provisions in the existing laws often acts as road blocks in the development of these AI systems and denies IP protection to the works produced by AI machines autonomously. It is high time that these enactments are amended to accommodate more advanced and sophisticated technologies including the concept of machine inventorship or authorship, which is in conflict with intellectual property laws as well as attribution of such rights and liabilities to a non-human entity.

It is highly unlikely that the patent offices and national courts will allow a machine to become an inventor or author and own patent or copyright rights under the prevailing laws. Moreover, if an inventive machine is working as a black box,[1] it will become even more challenging for humans to get patent protection for computer implemented or computer assisted inventions.

If IP protection is not provided, it may demotivate inventors who are likely to create and invest in this type of autonomous system (i.e., research).

2. Statement of Problem-

The current IP laws need severe upgrading to come up to par with the artificial intelligence that is continuously growing. If they are not upgraded the artificial intelligence would keep on becoming smarter to such a point where the current laws would not be able to serve human needs. If there is no legitimate author or inventor, IP

[1] Black box AI is any artificial intelligence system whose inputs and operations are not visible to the user or another interested party. A black box, in a general sense, is an impenetrable system. That process is largely self-directed and is generally difficult for data scientists, programmers and users to interpret.

rights may never be granted or become valid or enforceable in the courts. If there is no protection for this type of machine work, the work will fall into the public domain and no one will be benefited from it, not even the society. Now humankind stands on the threshold of an era when ever more sophisticated robots, bots, androids and other manifestations of artificial intelligence ("AI") seem to be poised to unleash a new industrial revolution, which is likely to leave no stratum of society untouched, it is vitally important for the legislature to consider its legal and ethical implications and effects, without stifling innovation.

3. Research Objectives-

The objective of this study is to use Doctrinal Research to analyse the given acts and develop a suggestive comprehensive guideline in relation to the applicability of Intellectual Property Law principles and concepts on the new arena of Artificial Intelligence. The outcome of this research is intended to serve as a scholarly reference to researchers in IP, R&D institutions, private entities, public agencies, universities, in developing, crafting their IPRs regulations, laws, policies with regards to AI inventions along with the new developments in technologies meant to positively enhance economic growth and development. Keeping the said purpose in mind this research pursues the following research objectives:

1) To examine the scope of 'inventorship" or "Author" through identification of AI-generated inventions and Human generated inventions, with plausible systematic policy, for examining the eligibility of creation or invention generated by AI for intellectual property protection and its legal rights.

2) To provide an insight into the expanding scope of Intellectual Property Rights and Artificial Intelligence, along with the inevitable challenges it brings from a global perspective and to give possible suggestive measures.

3) To analyse plausible consequences on intellectual property and innovation due to rapid and unregulated development of Artificial Intelligence (AI).

4) To determine the liability and responsibilities of Artificial Machines for potential infringement or violation of laws caused through its inventions and suggest a legal framework cum modification in domestic laws to resolve such lingering uncertainty.

5) To develop a suggestive comprehensive guideline for IPR Protection of AI generated inventions under the Trade Related Aspects of Intellectual Property Rights (TRIPS) based on the comparative analysis of various legal authorities under different jurisdictions like European Union, United States of America, and India.

4. Review of Literature -

It is the study of already established knowledge pertaining to the area that enables us to perceive clearly what is already lighted up in that area and what still remains enveloped in darkness. Emphasizing the importance of related literature may provide guiding research problem, suggestive methods of investigation and comparative data for interpretative purposes. The study of related literature equips the researcher with the understanding and knowledge of the problem in a proper perspective. The relevant literature reviewed for the present study is described as under:

Books-

- RUSSELL, STUART J.; NORVIG, PETER (2009). Artificial intelligence: A Modern Approach (3rd ed.). *Upper saddle river, new jersey: prentice hall*. ISBN 978013604259

This book is a collection of articles about major issues in the theory and practice of artificial intelligence, written by foreign specialists, that aims to fill the gap in Laws and Other major jurisdictions regarding knowledge and understanding about this increasingly critical area of law. It shows development of all-important legal concepts through experience of various countries and comprehensive survey and analysis of key concepts and issues Artificial Intelligence It demonstrates user friendly structure which presents analysis of both topic-by-topic and jurisdiction-by-jurisdiction issues AI regime across the globe. But this article does not cover issues like rights and liabilities of AI-generated Inventions.

- Christopher May and Susan K. Sell, "*Intellectual property rights: A critical history*." Lynne Rienner Publishers, (2006);

In this book the author has explained the history of Intellectual property, How India became a part of TRIPS, about the history and current scenario of copyright and Patent.

But the author has not discussed about the definition and concept of Artificial Intelligence, relation between copyright and patent with respect to Artificial Intelligence, all the legislations related to IPR which has implications to AI works in India. And there is a high recommendation in amending the present laws and making new laws which would help AI system to function properly.

Articles-

- Pamela Samuelson, "*Allocating Ownership Rights in Computer-Generated Works*", U. Pitt. L. Rev 1185 (1985);

In this article the author has focused on the recent boom in Artificial Intelligence. The author has emphasized non-human authors in all the creative works recently made. Computer programs, algorithm, learning from machines and data mining are the new source of creativity. In this the author has tried to reinterpret the concept of employee's and employer's relationship rather than redefining "authorships". The reinterpretation of this concept would give a better view in understanding authorship.

But the paper lacks the concepts like crucial features in Artificial Intelligence with that the author and ownership given to AI works under copyright.

- Artificial Intelligence and The Copyright Dilemma" by Kalin Hristov, *Journal of Science Policy & Governance,* Volume 16, Issue 01.

In this article the author has focused on the protection given to software in under copyright. Will computer program per se can be copyrightable or originality is important all are present in this paper. in this article the author has focused on authorship. Author has discussed about the disputes in case of ownership between the author and the AI in copyright, the matter of liability in case of infringement and has also given a wide view of Indian scenario with respect to Indian legislation.

But, the requirement and eligibility for acquiring copyright to AI- generated work is still lacking

- Erica Fraser's "*Computers as Inventors-Legal and Policy implications of Artificial intelligence on Patent*", Scripted- A journal of law, Technology and Society. Volume 13, Issue 3.

Author in this article it gives a detailed description on Patent with respect to Artificial Intelligence. This tells us about Computer assisted and computer- generated patent text, policies involved in it, legal reliability, inventive steps, criteria of patentability and patent subject matters.

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- **Abbott, R. 2016. *"I think, therefore I invent creative computers and the future of patent law.*" Boston College Law Review 57, (1079).**

In this article the author has focused on the challenges faced by the patent system due to the establishment of the thinking machines, challenges between inventor and inventions, challenges faced due to sudden and speedy change in technology and also challenges faced during the test of novelty and non-obviousness.

But paper lacks in giving few recommendations to be done in the legislation regarding the patent system and Artificial Intelligence.

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But paper lacks in giving few recommendations to be done in the legislation regarding the patent system and Artificial Intelligence.

- **Prof Bart Custers, *Law and Artificial Intelligence: Regulating AI and Applying AI in Legal Practice*, Springer, 2002**

This book provides an overview of what is currently happening in the field of Law and Artificial Intelligence (AI). From deep fakes and disinformation to killer robots, surgical robots, and AI law-making, the many and varied contributors to this volume discuss how AI could and should be regulated in the areas of public law, including constitutional law, human rights law, criminal law, and tax law, as well as areas of private law, including liability law, competition law, and consumer law.
Aimed at an audience without a background in technology, this book does not cover how AI changes these areas of law as well as legal practice itself in-depth. The glaring gap in this book is it does not cover some interesting issues in the world of intellectual property, not the least of which is attributing authorship over works authored by artificial intelligence.

- **Thomas Wischmeyer & Timo Rademacher, Regulating Artificial Intelligence, Springer, 2002**

This book assesses the normative and practical challenges for artificial intelligence (AI) regulation, offers comprehensive information on the laws that currently shape or restrict the design or use of AI, and develops policy recommendations for those areas in which regulation is most urgently needed. By gathering contributions from scholars who are experts in their respective fields of legal research, it demonstrates that AI regulation is not a specialized sub-discipline, but affects the entire legal system and thus concerns all lawyers. Machine learning-based technology, which lies at the heart of what is commonly referred to as AI, is increasingly being employed to make policy and business decisions with broad social impacts, and therefore runs the risk of causing wide-scale damage. At the same time, AI technology is becoming more and more complex and difficult to understand, making it harder to determine whether or not it is being used in accordance with the law. In light of this situation, even tech enthusiasts are calling for stricter regulation of AI. Legislators, too, are stepping in and have begun to pass AI laws, including the prohibition of automated decision-making systems in Article 22 of the General Data Protection Regulation, the New York City AI transparency bill, and the 2017 amendments to the German Cartel Act and German Administrative Procedure Act. While the belief that something needs to be done is widely shared, there is far less clarity about what exactly can or should be done, or what effective regulation might look like. The book is divided into two major parts, the first of which focuses on features common

to most AI systems, and explores how they relate to the legal framework for data-driven technologies, which already exists in the form of (national and supra-national) constitutional law, EU data protection and competition law, and anti-discrimination law. In the second part, the book examines in detail a number of relevant sectors in which AI is increasingly shaping decision-making processes, ranging from the notorious social media and the legal, financial and healthcare industries, to fields like law enforcement and tax law, in which we can observe how regulation by AI is becoming a reality.

- **Woodrow Barfield & Ugo Pagallo*, Advanced Introduction to Law and Artificial Intelligence,* Edward Elgar Publishing, 2020**

Elgar Advanced Introductions are stimulating and thoughtful introductions to major fields in the social sciences and law, expertly written by the world's leading scholars. Designed to be accessible yet rigorous, they offer concise and lucid surveys of the substantive and policy issues associated with discrete subject areas. Woodrow Barfield and Ugo Pagallo present a succinct introduction to the legal issues related to the design and use of artificial intelligence (AI). Exploring human rights, constitutional law, data protection, criminal law, tort law, and intellectual property law, they consider the laws of a number of jurisdictions including the US, the European Union, Japan, and China, making reference to case law and statutes. Key features include: - a critical insight into human rights and constitutional law issues which may be affected by the use of AI - discussion of the concept of legal personhood and how the law might respond as AI evolves in intelligence - an introduction to current laws and statutes which apply to AI and an identification of the areas where future challenges to the law may arise. This Advanced Introduction is ideal for law and social science students with an interest in how the law applies to AI. It also provides a useful entry point for legal practitioners seeking an understanding of this emerging field.

- ***Artificial Intelligence and Intellectual Property Get access Arrow, Jyh-An Lee (ed.), Reto Hilty (ed.), Kung-Chung Liu (ed.), 25 February 2021***

This book explores artificial intelligence (AI), which has become omnipresent in today's business environment: from chatbots to healthcare services to various ways of creating

useful information. While AI has been increasingly used to optimize various creative and innovative processes, the integration of AI into products, services, and other operational procedures raises significant concerns across virtually all areas of intellectual property (IP) law. Thus, AI has drawn extensive attention from IP experts globally and there have been some works on specific issues in the intersection between AI and IP. Surprisingly, however, there has not been a book providing a broad and comprehensive picture from the perspectives of the very nature of AI technology, its commercial implications, its interaction with different kinds of IP, IP administration, software and data, its social and economic impact on the innovation policy, and ultimately AI's eligibility as a legal entity. The book aims to fill the gap.

- ***Intellectual Property Justification for Artificial Intelligence Get access Arrow, Reto M Hilty, Jörg Hoffmann, Stefan Scheuerer, February 2021***

Against the backdrop of the current discussion of how AI reshapes certain IP paradigms, this chapter reassesses the need for IP protection in AI markets per se. We assess the question of justification of IP rights for both AI as a tool and AI-generated output in light of the very theoretical foundations of IP protection (from both legal embedded deontological and utilitarian economic standpoints). Traditionally, IP protection is granted due to deontological reasoning, according to which a human creator’s personality and efforts have to be protected, and economic reasoning, according to which exclusive rights in intangible goods have to be established in order to remedy market failure in public goods markets. IP ought to serve as a regulatory system of stimulation of creation and innovation using market forces to achieve this goal. Based on the current state of knowledge, however, it seems that specific market implications of the widespread use of most AI applications may have altered the justification for AI-related IP protection in certain cases. Whereas this seems particularly true regarding AI tools, the case for AI outputs may be different.

- ***Technical Elements of Machine Learning for Intellectual Property Law Get access Arrow Anthony Man-Cho So, February 2021***

Recent advances in artificial intelligence (AI) technologies have transformed our lives in

profound ways. Indeed, AI has not only enabled machines to see (eg, face recognition), hear (eg, music retrieval), speak (eg, speech synthesis), and read (eg, text processing), but also, so it seems, given machines the ability to think (eg, board game-playing) and create (eg, artwork generation). This chapter introduces the key technical elements of machine learning (ML), which is a rapidly growing sub-field in AI and drives many of the aforementioned applications. The goal is to elucidate the ways human efforts are involved in the development of ML solutions, so as to facilitate legal discussions on intellectual property issues.

- ***Jyh-An Lee, Reto M Hilty, and Kung-Chung Liu, Roadmap to Artificial Intelligence and Intellectual Property In: Artificial Intelligence and Intellectual Property. Edited by: Jyh-An Lee, Reto M Hilty, and Kung-Chung Liu, Oxford University Press (2021).***

This introductory chapter provides an overview of the relationship between artificial intelligence (AI) and intellectual property (IP). While human beings have used various instruments and technologies to create and innovate, they themselves have been the main driving force of creativity and innovation. AI puts that into question, raising numerous challenges to the existing IP regime. Traditionally, the "intellectual" part of "intellectual property" refers to human intellect. However, since machines have become intelligent and are increasingly capable of making creative, innovative choices based on opaque algorithms, the "intellectual" in "intellectual property" turns out to be perplexing. Existing human-centric IP regimes based on promoting incentives and avoiding disincentives may no longer be relevant—or even positively detrimental—if AI comes into play. Moreover, AI has sparked new issues in IP law regarding legal subjects, scope, standards of protection, exceptions, and relationships between actors.

- ***Reto M Hilty, Jörg Hoffmann, and Stefan Scheuerer,*** *Intellectual Property Justification for Artificial Intelligence* ***In:*** *Artificial Intelligence and Intellectual Property****. Edited by: Jyh-An Lee, Reto M Hilty, and Kung-Chung Liu, Oxford University Press (2021)***

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- ***Dr. Sik Cheng Peng, ARTIFICIAL INTELLIGENCE AND COPYRIGHT: THE AUTHORS' CONUNDRUM, Centre for Law and Ethics in Science and Technology (CELEST), University of Malaya.***

In the last few years, the world witnessed the generation of creative works by artificial intelligence (AI). The development of artificial intelligence towards technologies capable of autonomous creation brings to the fore several interesting yet muddled copyright questions. The questions include whether a man-made machine, or intelligent agent, may be regarded as an 'author' in the eyes of copyright law. This question has already sparked debates and differing views. Closely associated with the authorship issue, other issues relating to the duration of copyright in the works and authors' moral rights inevitably arise. In Malaysia, copyright in literary, artistic and musical works is protected during the life of the author plus fifty years after the author's death. If a robot with artificial intelligence is treated as the author of a literary, artistic, or musical work, it has produced a copyright work, and if it subsists, the copyright will be potentially permanent as long as the robot does not 'die'. This paper seeks to examine whether AI-produced works are eligible for copyright protection in view of the non-human author. Ultimately, this paper aims to determine whether AI produced works should be protected under copyright law at all.

- ***Bruderer H, 'The Birth of Artificial Intelligence: First Conference on Artificial Intelligence in Paris in 1951?' in International Communities of Invention and Innovation. HC 2016, IFIP Advances in Information and Communication Technology, vol 491 (Tatnall A & Leslie C eds, Springer International Publishing, 2016)***

The Article investigates whether creative works produced via machine learning algorithms qualify for copyright protection. Previous research into this question has been largely theoretical. By contrast, the Article introduces four empirical case studies of works produced via machine learning. The Article examines the copyrightability of such works under U.S., E.U., and U.K., law. The Article concludes that such works are sufficiently original to qualify for copyright protection. This conclusion casts into doubt prior literature that finds works of machine learning algorithms to be outside the scope of copyright protection. Artificial Intelligence has transformed the role of computers from being a simple calculation machine to an autonomously creative work generating system. Artificial Intelligence is helping machines to not only understand complex data and learn from it but also to generate novel works which are historically associated with human ingenuity. The rise of inventive Artificial Intelligence has created a stir in the traditional paradigm of patentability. Artificial Intelligence creations has posed a challenge to the inventorship criteria in patent system which does not recognize nonhuman entities as inventors. The recognition of Artificial Intelligence driven machines as inventors could lead to further complicated issues which the present patent system may not be able to accommodate. Rise in instances of independently generated creations by Artificial Intelligence raises certain issues with regard to patentability of such creations. This Article addresses this new phenomenon of Artificial Intelligence and instances where machines have created inventions with no or minimum human interventions. This article would further delve into the issues related to AI inventorship and what implications it would have for the current patent system. It can be seen that a problem arises when trying to determine ownership of copyrights with regards to artic, musical, or literary works created by AIs. In jurisdictions such as India, the copyright is given to the closest human connection to the AI, which is the programmer or the owner of the AI. This causes the problem of lack of creativity, as the programmer or owner does not contribute to the creation of the final work. Another problem is the vast amount of data used by the AI to create the work. It could lead to copyright infringement and ambiguity with regards to

who should be held liable. So, to solve these issues, AIs should be considered as legal entities for the purposes of Copyright and a separate type of copyright should be given to such works, with new legislations to govern them. At present, the "Modicum of Creativity" test is used to determine if a work can be protected by Copyright. But with regards to AI generated works, the "Sweat of the Brow" test should be used. This provides for a lower standard to provide copyright protection. An AI specific copyright law would help to ensure that the AI receives the copyright, which mitigates the problem of lack of creativity and also a lower standard of infringement should be created so that the vast amount of data that the AI uses is not subject to unnecessary copyright infringement. The Swear of the Brow test states that a work can be granted copyright protection if the author applies their labour to create a work that is not an exact copy of the pre-existing work. In this case the AI, which is the author, would technically be applying its own labour and even though it uses vast amount of data, as long as it is not an exact reproduction, it would not amount to Copyright infringement. With the advancements of AI, it will become more and more imperative to have legislation's to regulate AIs and their works.

- ***Hugenholtz, P.B., Quintais, J.P. Copyright and Artificial Creation: Does EU Copyright Law Protect AI-Assisted Output?. IIC 52, 1190–1216 (2021). https://doi.org/10.1007/s40319-021-01115-0***

This article queries whether and to what extent works produced with the aid of AI systems – AI-assisted output – are protected under EU copyright standards. We carry out a doctrinal legal analysis to scrutinise the concepts of "work", "originality" and "creative freedom", as well as the notion of authorship, as set forth in the EU copyright acquis and developed in the case-law of the Court of Justice. On this basis, we develop a four-step test to assess whether AI-assisted output qualifies as an original work of authorship under EU law, and how the existing rules on authorship may apply. Our conclusion is that current EU copyright rules are generally suitable and sufficiently flexible to deal with the challenges posed by AI-assisted output. We believe that the EU copyright framework is generally suitable and sufficiently flexible to deal with the current challenges posed by AI-assisted creation. Producers of AI-assisted output will in many cases enjoy copyright protection. Moreover, "authorless" AI output might still qualify for protection against misappropriation under less demanding IP regimes, such as neighbouring rights and sui

generis database protection, or other doctrines such as trade secrets and unfair competition. In this light, regulatory intervention to extend copyright protection beyond the current EU rules would be justified only if solid empirical economic analysis were to reveal that the absence of protection harms overall economic welfare in the EU.

- **Rosa Maria Ballardini, Kan He & Teemu Roo, "AI-Generated Content: Authorship and Inventorship in the Age of Artificial Intelligence Authors".**

According to the author, IPRs are intended to safeguard the products of the human mind. IPRs are restricted exclusive rights given to "persons," which might be actual or fictitious. Therefore, the idea of an author or inventor as a natural person has long been a foundational element of both copyright and patent laws in Europe. In fact, this notion is represented in the legal definitions of author and inventor, as well as in ideas like "labour" and "innovation," as well as in the qualifications needed to obtain protection. AI naturally allows for the creation of inventions in a "autonomous" manner. Now the pertinent questions are can AI-generated creation be patented or attract IPR protection under the laws in place today? It has now become necessary to hone the comprehension of the authors and inventors in the light of fast developing AI technologies.

Technology is now shaking up every aspect of our daily lives, this has also generated tension in the intellectual property system. With the increasing role of AI technologies, the roles of authors and inventors are also becoming blurred. This will challenge the already established notions of authorship and inventorship in the copyrights and trademark laws. The revolutionary and romantic schools do not seem justifiable both from the perspective of legal traditions and neither from the perspective of economic wellbeing. The Revolutionary school gives AI legal personality, which is fundamentally in contradiction with how we typically perceive the law. The need to compensate human contributors to the creative process still exists even when the AI is the author or creator; however, making this judgement may be too difficult at this point.

The Romantic school unequivocally rejects the possibility of attracting IPRs to ideas produced by non-humans. This strategy, however, fails to offer equivalent incentives to the humans responsible for developing AI systems and, eventually, the output produced by AI. As a compromise, the Modernist school grants IPR rights to natural individuals who have made a major contribution to the content produced by AI. In light of this, it might be more appropriate to encourage creativity in a world of AI-generated content. It

delivers a realistic and proportionate incentive to the human element of the innovation process that ultimately led to the AI-generated output while not compromising universally recognised legal norms on the one hand.

- **Colin R.Davies, An evolutionary step in intellectual property rights – Artificial intelligence and intellectual property.**

The authors analysis and discussion of the ownership of computer-generated works within patents and copyright, the current system is grossly unable to deal with the expanding usage of more and more intuitive artificial intelligence systems in the creation of such works. Before considering the possibility of creating a new legal personality to which such rights could be awarded in order to address the problems with the current system, it takes into account the various claims of interested parties to such rights. This article will analyze the present system of intellectual property rights ownership for computer-generated works and ideas while also taking other options into consideration. While the position is ambiguous under UK patent law, computer generated works are specifically addressed in UK copyright legislation. A computer-generated work is one that is created entirely by a computer, according to section 178 of the UK Copyright Designs and Patent Act (CDPA). According to section 9(3) of the CDPA, the individual who makes the arrangements required to produce the work is granted authorship of it. The writer claims that this is just a tool to help with the problem of determining real authorship in such works, based on the already debunked assumption that a computer is nothing more than a tool. As stated in Section 9(1), which confirms that the author of a work is the person who creates it, and Section 9(3), which specifically deviates from this for computer-generated works, it is submitted that the person responsible for such arrangements is not the true author under established copyright principles, nor does he have any more rights thereto than other people involved in the process, such as the original programmer, the data operator, and/or the original creator. These interested parties' individual rights shall be taken into account.

Law should not be founded on expediency but on clearly defined and rational concepts. Furthermore, there may come a time when this fabricated grant of authorship is challenged in court. The law must give parties assurance, and we must be proactive in foreseeing future issues and enacting legislation before the event. Even if doing so necessitates a fundamental change in perspective and the invention of a new type of legal

personality, we must clearly identify the true author/inventor of such works and embrace the truth that the rights should be assigned to this entity. A computer that is more like a real person, particularly with the current generation of artificially intelligent computers, should be given the same status. Under UK law, a body corporate has legal recognition as an individual. As a result, we will be able to credit authorship of computer-generated works and innovations to the entity most deserving of it—the computer—and allow the various claims of interested parties to be decided by the parties themselves, through contractual terms that they have agreed. This may be revolutionary, but not any more so than giving a body corporate the same intellectual property right that we presently do.

- **Madeleine de Cock Buning, "*Artificial intelligence and the creative industry: new challenges for the EU paradigm for art and technology by autonomous creation".***

The authors say that although artificial intelligence (AI) has come a long way in the last several decades, it is only going to get exponentially smarter and more independent in the future. This poses a number of questions regarding the current legal doctrine, such as whether the output of AI entities should be considered "speech," the degree to which AI should be governed by antitrust and criminal law statutes, and whether AI should be regarded as an independent agent and held accountable for its actions under the law of tort or agency. The Research Handbook covers current law, statutes, and regulations on the function of law in an era of increasingly intelligent AI, covering legal issues that are crucial to the development of AI and its role in society. Its chapters were authored by top U.S., EU, and international law specialists. The Research Handbook makes use of the free speech doctrine, criminal law, concerns about data protection and privacy, legal rights for increasingly intelligent AI systems, and a discussion of jurisdiction for AI entities that will not be "content" to remain within the geographical bounds of any nation state or be tied to a specific physical location to provide a comprehensive coverage of the topic. The chapter authors address the political and jurisdictional choices that will need to be made as AI spreads through society and changes our government and social institutions using several examples and case studies. The Research Handbook will also introduce creators of AI systems to the legal concerns that surround the creation and application of AI as they relate to technology, algorithms, and analytical methods. A valuable resource for academics and students interested in information and intellectual property law, privacy, and data protection, as well as legal theorists and social scientists who write about the future direction and implications of AI, is this essential guide to the

U.S., EU, and other international law, regulations, and statutes that apply to the emerging field of "law and AI." The Research Handbook will be a valuable resource for both computer scientists and engineers who are actively involved in the creation and use of the next generation of AI systems as well as legal professionals in many countries who may challenge issues associated AI.

- **WIPO Conversation on Intellectual Property (IP) and Artificial Intelligence (AI), DECEMBER 13, 2019**

Artificial intelligence (AI) has become a multipurpose technology with numerous uses in the economy and in society. It already has a substantial impact on the development, production, and distribution of commercial and cultural goods and services and is projected to have an increasing impact in the future. As a result, AI and intellectual property (IP) policy interact in a variety of ways because IP legislation is primarily intended to promote innovation and creativity in the social, economic, and cultural systems.

The administration of applications for IP protection is increasingly using AI applications. Two examples of such AI applications are WIPO Translate and WIPO Brand Picture Search, which employ AI-based software for automatic translation and image recognition, respectively. Other AI applications have been created and implemented by a number of IP Offices globally. WIPO organised a meeting in May 2018 to examine potential AI uses and to encourage information sharing and such programmes.

The Organization will keep up this conversation and exchange by using its ability to bring people together and its status as the international body in charge of IP policy. For many nations throughout the world, AI has evolved into a strategic capability. AI capacity development strategies and AI regulatory measures are being employed more frequently. The Organization has been urged by its Member States to compile the most important legislative measures relevant to AI and IP with their assistance. To that purpose, a special website will soon be launched that aims to link to these different sources in a way that encourages information sharing. Many governments all over the world now view AI as a strategic capability. There has been an increase in the use of strategies for building AI capabilities and AI regulatory measures. The Organization has been urged by its Member States to assemble with their assistance the primary legislative frameworks relevant to AI and IP. In order to do this, a dedicated website will soon be released that aims to link to

these numerous resources in a way that encourages knowledge exchange. The third thread aims to create a list of the key problems and issues that are emerging for IP policy as a result of the emergence of AI as an increasingly popular general-purpose technology. It is an open and participatory approach. A Conversation was held at WIPO in September 2019 with the participation of Member States and representatives from the business, research, and non-governmental sectors in order to achieve this goal. A plan for the continuation of the conversation by switching to a more structured interaction was agreed upon in outline at the end of the conversation. The WIPO Secretariat will prepare a list of potential concerns that could serve as the foundation for a consensus on the key issues that need to be considered or resolved in relation to IP policy and AI as the first step in the strategy.

There are just a few nations that have the knowledge and resources needed for AI. The current technology divide runs the danger of becoming wider rather than narrower over time because AI technology is developing quickly at the same time. In addition, even while capability is restricted to a few number of nations, the implications of the deployment of AI are not and won't be restricted to those nations alone.

Many questions and challenges are raised by this developing situation, but many of them go far beyond IP policy, such as those pertaining to labour policy, ethics, human rights, and other issues. The WIPO's mandate and the current list of topics solely deal with intellectual property, innovation, and creative expression. Are there any steps or concerns that should be taken into account in the realm of IP that can help lessen the negative effects of the technology gap in AI?

- **Karen Robinson, "Copyrights in the Era of AI", *Adobe Blog,* February 27, 2020*, available at:* https://blog.adobe.com/en/publish/2020/02/27/copyrights-in-the-era-of-ai.html#gs.opdukw.**

The author specifically talks about Adobe's nearly 40 years old history. The authors and artists with the newest technology to help them realize their boldest, most ambitious ideas. And have consistently advocated for strong copyright protections. Adobe granted licences for numerous millions of premium photos, illustrations, films, 3D objects, and templates that are hand-selected and included into Adobe products. Artificial intelligence (AI) developments are currently transforming the creative process. Creative professionals

save time by having the most frequently used products, like Adobe Photoshop, tailored to their skill level and areas of focus. For example, a graphic designer can now use AI-assisted search to find relevant stock images more easily. A filmmaker can review footage more quickly and receive recommendations on potential edits. Opportunities that could only be opened with the availability of data to train AI systems are now available in this new world of AI-powered creation. These AI models and systems are "trained" by examining enormous volumes of data to find patterns that automate particular actions and judgments. The model's output gets increasingly accurate and polished as more data is fed through it.

The information needed for AI systems frequently consists of copyrighted material. When the training data contains copyrighted content, this process often referred to as "machine learning "raises a crucial intellectual property concern: does including protected content when developing an AI model constitute infringement? The value of the protected content contains the answer to this query. According to the fair use doctrine, it is unlikely to be regarded as fair use if the use of copyrighted material lowers the market value of the work for its original creator. In most cases, using copyrighted works to train algorithms does not significantly lower the work's economic value. Additionally, the value of the copyrighted work is unaffected if a tool powered by the algorithm is used to produce something entirely new. Even though handling copyrighted material appears simple, the legal foundation for handling copyrighted material with AI has not been addressed. Use of copyrighted works for the non-expressive aim of training AI models is suggested to be fair use in a number of situations, most notably the litigation involving Google Books. However, without clear direction from judges or regulators, researchers and developers in the fields of artificial intelligence and machine learning lack the type of assurance necessary for AI to thrive.

This reality invites the obvious question: what is the best strategy for creating a proper legal framework for handling copyrighted content in AI systems? We may, however, look to a few non-American nations for guidance on how to reap the rewards of allowing the use of copyrighted material to train AI. For instance, the Japanese government recently amended its copyright regulations to enable exceptions for the use of copyrighted works in machine learning. China, Australia, Singapore, and Thailand are among the nations considering similar moves. Additionally, as part of its Copyright Directive, the European

Union recently adopted limited text and data mining exceptions and is still looking into other improvements.

The United States currently leads the world in AI, but if our policies excessively impede or restrict access to data, we risk fast losing ground. AI may continue to thrive in the US if a more defined legal or regulatory framework were established for this kind of activity.

An all-or-nothing mindset should be avoided by policymakers and regulators. On the one hand, lowering copyright requirements everywhere would rob content creators of the crucial safeguards they depend on. Conversely, enforcing excessively rigid copyright regulations would impede innovation. Instead, they must adopt a moderate stance that safeguards intellectual property rights without obstructing the creation of AI tools and software.

According to the author our conventional beliefs regarding authorship in circumstances of Computer-Generated Work are being challenged by the growing contribution of Artificial Intelligence (broadly referred to as "computers") to the creative process . This excerpt contends that Computer-Generated Work should not be compelled to comply with the current copyrights framework, in contrast to the opinions of many researchers, including the one previously. Instead, a legal structure particular to computer-generated works is required, with Section 9(3) of the Designs and Patent Act (CPDA) 1998 serving as a useful example.

Traditionally, identifying the author of a piece of work when computers are used to generate an expected output under the direct guidance of human writers (such as when creating a poem using Microsoft Word) has not been a problem. In contrast, there appears to be a disconnect between human input and computer output when computers act independently, producing Computer-Generated Works algorithmically, sequentially, or in a non-deterministic manner, endangering the monolithic romantic author model's "individual creative personality". When Computer-Generated Works are produced by a computer programme that was programmed and utilised by two different people, identifying the author becomes much more difficult. The computer programmer, the computer user, and the computer itself are now at least three different types of authors.

Even so, it is not immediately apparent why Computer-generated Work cannot be protected under the conventional copyright’s regime. On the one hand, academics rightly

claim that the issues outlined above are not entirely new (ibid). There could be a case made for not giving computers copyrights. For instance, Computer-Generated Work is (now) produced under the programmers' original instructions and parameters, having a "sufficient connection to human creativity [of the programmer]" even when computers appear to be independent artists . Furthermore, assigning copyrights to computers may be bad from a policy standpoint because, unlike people, computers do not require recognition of their "rights" or financial incentives to be creative. Accordingly, it appears that the difficulty revolves around dividing copyright ownership between the user and the programmer. We shouldn't let the digital aspect of this decision blind us to the fact that analogous judgments have already been taken offline, where a variety of actors have contributed to the final product.

Although it may be tempting to view Computer-Generated Works as the same as human creativity, the more the computer produces than its users and programmers put in, the more difficult it becomes to refer to either as an author in the conventional sense .Google's Deep Dream, which generates original visuals using an algorithm but is less accurate and obvious than a straightforward algorithmic creation, is a noteworthy example . Thus, it serves as an example of a larger trend of computers' remarkable ability to emulate human creativity by exhibiting features like originality and unpredictability. Claiming that "old-fashioned pen-and-paper works" are conceptually equivalent to computer-generated works in this context is to neglect the pluralistic creation of the computer-generated works, which is the consequence of the contributions of the human author and the machine.

Thus, legislation that is specific to computer-generated work is required. It is asserted that Section 9(3) serves as a useful example in this regard. Section 9(3) expressly acknowledges the legal fiction involved in granting copyright to the human programmer/user, the author-in-law, who may not be the (only) author-in-fact, by designating that person as the author by stating that they were "the person... [who made]... the arrangements necessary for the creation of [Computer-Generated Works]" (Bridy, 2012). This reveals a deliberate policy decision to give the former the copyright even though he or she may not actually be the (only) "creator" of the in-question work. In addition, the existing case-law on Section 9(3) illustrates a case-by-case approach, despite researchers' worries that legislation relating to Computer-Generated Works may "blind us to the vast diversity that category [Computer-Generated Works] encompasses. For

instance, the user was awarded the copyright in Express Newspapers, which came before Section 9(3), where the computer was utilised like a "pen" and a "tool." As an alternative, in Nova Productions, the court decided to give the copyright to the programmer rather than the user of the application after having to decide who created the graphic work in question. Judge Jacob LJ specifically assessed the user's putative authorship and ultimately rejected it on the grounds that it was "not creative in nature and neither has he contributed to skill or labour." This demonstrates how Section 9(3) allows for a flexible framework that accounts for the various ways that computer-generated works can be produced.

- **ARTIFICIAL INTELLIGENCE AND COPYRIGHT: THE AUTHORS' CONUNDRUM, Sik Cheng Peng**

The creation of artistic works by artificial intelligence has been observed throughout the world in recent years (AI). The advancement of artificial intelligence toward autonomous creation technologies raises a number of intriguing but complex copyright issues. One of the issues is whether a man-made computer or intelligent agent might be considered a "author" under copyright law. This query has already stirred discussions and divergent points of view. Other difficulties about the length of copyright in the works and authors' moral rights necessarily arise in close connection to the authorship question. In Malaysia, the author's lifetime as well as fifty years after death are included in the protection of copyright for written, visual, and musical works. If an artificially intelligent robot is recognised as the creator of a piece of literature, art, or music, the robot has created a copyright work, and if it survives, the copyright may last as long as the robot does not "die." In light of the non-human author, this research investigates whether AI-produced works are qualified for copyright protection. Ultimately, this paper aims to determine whether AI produced works should be protected under copyright law at all.

According to the author new forms of works should only be protected by copyright law when there is a strong case for doing so. We should keep an eye on whether the lack of copyright protection in works created by AI will hurt the interested parties in any way. The future will reveal whether there is a genuine market or public demand for AI-produced works as well as whether they can be distinguished from human-created ones.

Consideration and consideration should be given to whether copyright protection for works produced by AI is actually necessary, given the growth of AI technology, where creative works may be produced quickly and readily.

We should never take copyright protection for granted and should always be prepared to disregard it in works created by artificial intelligence. In fact, it is past due to re-examine copyright protection for digital creations that, in general, include little to no human involvement. For instance, one might question why copyright protects many millions of images taken with AI-powered cameras for such a long time, i.e., during the author's lifetime and for fifty years after the author's passing. It is highly questionable whether the so-called author's minimal contribution, which may be nothing more than the mechanical act of pressing the shutter button, justifies such a lengthy copyright protection.

It may be wise for the law to distinguish between AI-produced works and conventional human-created works, with the former being protected by a *sui generis* right and the latter by copyright, if the necessity to protect AI-produced works emerges.

- ***Iglesias Portela, M., Shamuilia, S. and Anderberg, A., Intellectual Property and Artificial Intelligence - A literature review, EUR 30017 EN, Publications Office of the European Union, Luxembourg, 2021, ISBN 978-92-76-30695-5, doi:10.2760/8600, JRC119102***.

Artificial intelligence has entered into the sphere of creativity and ingenuity. Recent headlines refer to paintings produced by machines, music performed or composed by algorithms or drugs discovered by computer programs. This paper discusses the possible implications of the development and adoption of this new technology in the intellectual property framework and presents the opinions expressed by practitioners and legal scholars in recent publications. The literature review, although not intended to be exhaustive, reveals a series of questions that call for further reflection. These concern the protection of artificial intelligence by intellectual property, the use of data to feed algorithms, the protection of the results generated by intelligent machines as well as the relationship between ethical requirements of transparency and explainability and the interests of rights holders.

- **Swapnil Tripathi and Chandni Ghatak, Artificial Intelligence and Intellectual Property Law, 7 CHRIST UNIVERSITY LAW JOURNAL, 83, 84 (2017).**

Artificial intelligence systems have been gaining widespread momentum in today's progressing techsavvy world. With sophisticated technologies being incorporated in the same, it is only a matter of time these systems start to produce marvelous inventions without human intervention of any kind. This brings forth pertinent questions concerning Intellectual Property Rights, (IPR) for, it challenges not only traditional notions of concepts such as patents and copyrights, but also leads to the emergence of questions related to the regulation of such creations amidst others. This paper seeks to provide insight into the expanding scope of IPR laws and artificial intelligence, along with the inevitable challenges it brings from a worldwide lens on the matter. It also attempts to provide suggestions transcending IPR, and seeks to address questions concerning criminal liability for the content created by such technologies.

Artificial intelligence (AI) systems are growing at an exponential rate today, with more sophisticated forms of software being incorporated into them. AI enabled systems have transcended from performing simple calculations to producing poetry, art work, and other more complex creative work. This raises the question of whether or not such work can be afforded any special status under Intellectual Property (IP) laws, like any other form of work produced by an identifiable human source which is afforded protection under IP laws. This question unravels many other intricate issues, which through this paper the authors aim to highlight. The first part of the paper explains the concept of AI, followed by the IP discourse with the primary focus being on Copyright Laws and AI. Then the paper goes onto the more deliberative end of the copyright debate in connection with AI solutions and highlights the relation of patent laws with AI systems. The paper concludes by providing recommendations on these issues.

- ***Prof. A.Lakshminath&Dr.MukundSarda, Digital Revolution and Artificial Intelligence- Challenges to Legal Education and Legal Research, CNLU LJ (2) (2011-2012).***

The quest for innovation marks the growth of human civilization. Ingenuity manifests

itself in numerous ways, sometimes leading to spectacular revolutions. The transition from the era of the "idiot box" to that of the "thinking machine" as a consequence of the digital revolution is an instance of such a phenomenon. Unfortunately, there exists a dichotomy between the use of technology and even its access to different categories of people with the consequence that the advantages of information technology are not equally availed by all. This has led to a situation which is popularly known as the "digital divide", the implications of which are too obvious to be ignored. This concern is particularly relevant because the application of the software technology to serve the ends of justice can present an effective alternative to the beleaguered justice-delivery system and may be of significant assistance in achieving the merits of an ideal adjudication mechanism, which include, inter alia, timeliness, affordability and transparency of the judicial procedure.

The paper proposes a model legal counselling/judgment prediction system designed in such a manner so as to predict with considerable precision, the ends of a judgment. The model so designed, uses a system of scientific classification and a comprehensive catalogue of case details as its basic inputs and an inbuilt artificial intelligence-based programming to process the same. The paper further illustrates the idea and procedure underlying the same through schematic diagrams and sample cases.

The prospects are bright both for teaching and research in the application of computers. Inter-disciplinary studies in the area of the law and computers would provide a meaningful interaction between the legal academicians and technologists. Computers can be best used in two ways to assist the legal profession. One is the information retrieval system which can be developed with the help of law faculty and the computer science department. The second area in which computers can very usefully be employed is artificial intelligence system with which several types of stereotype cases can be decided with the help of computer programs to arrive at more objective and quicker decisions. The law faculty should actively engage in collaborative research with the computer science department. This needs to be pursued vigorously to design meaningful computerized programs as alternative dispute settlement mechanism.

- ***Ayush Pokhriyal & Vasu Gupta, Artificial Intelligence Generated works under Copyright Law, NLUJ Law Review 6(2) 93 (2020).***

The world as we know it has changed tremendously in leaps and bounds with the evolution of technology, but changes in law haven't always followed in synchrony. Traditionally creative works like writing and cooking which were conceptualized only to

the ingenuity of humans, have now become an apparent task of Artificial Intelligence. Since then, great advancement in programming and computational intelligence has opened many possible avenues of work for computers, one of which being creative works. This upsurge of mechanically created original work has led itself to a collision course with the Copyright Law in India, raising doubts in the minds of legal practitioners as to who shall be the owner of the said original creation. Applying the traditional rules of intellectual property law does not yield a plausible solution to this problem. This paper shall discuss whether autonomously developed mechanical creation can be copyrightable, and if yes then what are the basic impediments in the current legal scenario which prevents machines and Artificial Intelligence to be allowed such Intellectual Property Rights. The paper discusses the different scenarios of Copyright ownership in such mechanically generated works.

A dire need exists, to find out the most effective legal manner to protect autonomously developed creations in the international market. More specifically, this controversy has focused on whether these creations should be protected by amending and modifying existing forms of copyright ownership rights or by creating a completely new form of legal legislation. Artificial Intelligence is taking a predominant place in the daily lives of many individuals.

It is becoming evident that Artificial Intelligence will become even a bigger part of our lives in the foreseeable future. As they take a creative role more and more of intellectual property creations will be accredited to these AI bots. As such the question as to whom should the ownership of this intellectual property be vested with becomes important. The fate of millions of dollars of income in the form of book sales, royalties, art auctions etc. depends on to whom the ownership right goes. Does it go to the developer of Artificial Intelligence application, the Artificial Intelligence itself or into public domain? Giving it to the developer seems illogical under the current Intellectual Property Regime as giving ownership rights to an entity that did not conceive the idea or actively participate in its creation goes patently against the provisions of the Copyright Law. Although the developer created the software but it does not have control over what the software created. To give ownership rights to Artificial Intelligence itself is a slippery slope. The rights would be vested in the body incorporated to represent the Artificial Intelligence software. The problem with this approach is that it defeats the purpose of the law. The purpose of Copyright Law is to protect the creator and incentivize them to create more work but Artificial intelligence does not require incentive to create more work. It simply would not

remain a level playing field. To vest the right in no one but rather put the intellectual property in public domain would serve the consumer the best at present stage. The purpose of law is to protect and incentivize the creator but a creator does not exist in the traditional sense of it. Since AI generated work does not require incentive it makes sense to not give it protection under the law. However, issues exist in this paradigm as well. Putting the work in public domain is not commercially viable as a machine whose work is not saleable would not earn much for the developer of the machine. The Current field of Artificial Intelligence is at a nascent stage, and the potential for growth is limitless. But what is known for sure is that the Copyright law in its current form is incapable of dealing with work created by Artificial Intelligence. The problem that stems from works created by Artificial Intelligence are many.

Thus, it seems that the current Intellectual Property Law can be retained but a new interpretation can be provided which encourages growth in this budding technology and retains its principle that for an intellectual work to exist the closest human agency has to be found or the law could be amended to include artificial as an author like a corporation, to put the ownership rights in. It is clear that more research is needed in this field to find solutions to this problem to keep pace with the developments in Artificial Technology.

- ***Office Order No. 36(2017), INTELLECTUAL PROPERTY OFFICE (India), http://www.ipindia.nic.in/writereaddata/Portal/Images/pdf/Office_Order_No_36_of_2017_for_Revised__Guidelines_for_Examination_of_CRIs.pdf; Balaji Subramaniam, Patent Office Reboots CRI Guidelines Yet Again: Removes 'novel' Hardware Requirement, SPICYIP, https:// spicyip.com/ 2017/07/patent-office-reboots-cri-guidelines-yet-again-removes-novel-hardware-requirement.html.***

Artificial Intelligence (AI) is not a new concept, especially to the readers of science fiction. In recent times however, it is becoming more science and less fiction. The world of technology is changing rapidly, and Artificial Intelligence systems have been gaining widespread momentum. With sophisticated technologies being incorporated in the same, it is only a matter of time these systems start to produce marvellous inventions without human intervention of any kind. AI, simply put, is the capability of a machine to imitate intelligent behaviour. It is an umbrella term that refers to information systems inspired by biological systems, and encompasses multiple technologies including machine

learning, deep learning, computer vision, natural language processing (NLP) machine reasoning, and strong AI.

Most definitions of Artificial Intelligence in the standard texts are overly complex for a general survey of the field, so here is a simple one that will suffice instead: Artificial Intelligence is the science of mimicking human mental faculties in a computer.

The penetration of self-driven cars, robots and fully-automated machines, which are currently being used in various economies around the world, is only expected to increase with the passage of time. As a result, the dependency of entities and individuals on AI systems is also expected to increase proportionately. Whilst addressing the position of Artificial Intelligence, it would be imperative that the regulators undertake a reasonable and balanced approach. A positive step towards the recognition of AIs could be that, all member countries of multilateral trading forums begin to recognise the same, for instance, in the form of an amendment to Trips. The AIs today perform human like functions in every sphere. It would not be amusing if, tomorrow they can perform functions better than humans and take their decisions themselves. To keep a track of the same, a legislation governing AIs should be drafted, to provide for guidance/clarity as to the rights and obligations of programmers or creators of AI systems, in order to crystallise the broad ethical standards to which they are required to abide to whilst programming/creating AI and robotics systems. Due to the lack of legal jurisprudence on this subject, it is hoped that in the near future legal and tax principles are established which will not only foster the development of AI but also ensure that the necessary safeguards are in place.

- **Mailer, Artificial Intelligence & Intellectual Property Rights, October 2016 available at www.clairvolex.com**

Artificial intelligence and laws are coming to appoint where revision of laws is required to keep up with the technological advancements. Artificial intelligence is developing rapidly and there are possibilities that it may take over a lot of human endeavours one of which may also be a large part of law profession. Lawyers with their teams spend a lot of time in understanding and placing Patent claims. Hours are spent in investigating and analysing the novelty, utility and non-obvious nature of products and processes for which a claim is to be presented. A substantial expenditure goes into the process of patenting

something. Facilitating laws by including AI in the whole process may substantially save us time and money involved in the process. This paper has addressed how the old concepts of Intellectual Property are being stretched to the maximum to accommodate the disruptive consequences of the advent of Artificial Intelligence. In other words, granting Intellectual Property protection to Artificial Intelligence results, paradoxically, into challenging the very foundations of Intellectual Property law.

Now humankind stands on the threshold of an era when ever more sophisticated robots, bots, androids and other manifestations of artificial intelligence ("AI") seem to be poised to unleash a new industrial revolution, which is likely to leave no stratum of society untouched, it is vitally important for the legislature to consider its legal and ethical implications and effects, without stifling innovation.

The current IP laws need severe upgrading to come up to par with the artificial intelligence that is continuously growing. If they are not upgraded the artificial intelligence would keep on becoming smarter to such a point where the current laws would not be able to serve human needs. Using smart mixed AI and human models like the one mentioned above, could solve the fear problem that human being has and could also serve in making the process of achieving intellectual property rights more smooth, transparent and affective. Most of the laws are not designed substantially to work algorithmic. This is the main reason behind the discretions are provided to most of the judges when they are deciding the cases. The approach to completely convert the IP process to algorithmic decision-making lacks for the time being legal infrastructure and human experiences.

- ***Garikai Chimuka,Impact of artificial intelligence on patent law. Towards a new analytical framework – [the Multi-Level Model],World Patent Information,Volume 59,2019, available at https://doi.org/10.1016/j.wpi.2019.101926.(https://www.sciencedirect.com/science/article/pii/S0172219018300814)***

Inventions and new ideas are at the center of societal transformation. Inventions have been historically protected by a system of intellectual property law of which patents are at the heart. Whilst patent law is still deeply moored in its roots in the industrial revolution, to a greater extend it has been able to adapt to the successive revolutions like the computing albeit with some challenges. The world is now at an unprecedented

threshold of the most far-reaching revolution whose consequences to patent law in particular are so far reaching that its impact is still unknown. This is the AI revolution. This paper begins with an analysis of the AI revolution from available literature and research. It notes that there are divergent views among scholars about the impact of AI on various elements of patent law. It posits that this dissonance might be a result of most scholars treating AI as one homogenous block without distinguishing the various phases in the evolution of AI. It thus proposes a new *sui generis* conceptual framework – [the Multi-Level Model] as a suitable basis for insightful conceptual analysis of AI impact on patent law with focus on two key questions; patentability and inventorship.

AI as a concept is quite wide. The Multi-Level Model can assist in unpacking the impact of this AI revolution to patent law in a more laser focused manner. This is quite practical but also helpful to policymakers who in most cases may not have a full understanding of the width, breadth and depth/height of AI to really come up with informed policy choices in as far as patent law is concerned.

- ***Roll, I., & Wylie, R. (2016). Evolution and revolution in artificial intelligence in education. International Journal of Artificial Intelligence in Education, 26(2), 582-599.***

The field of Artificial Intelligence in Education (AIED) has undergone significant developments over the last twenty-five years. As we reflect on our past and shape our future, we ask two main questions: What are our major strengths? And, what new opportunities lay on the horizon? We analyse 47 papers from three years in the history of the Journal of AIED (1994, 2004, and 2014) to identify the foci and typical scenarios that occupy the field of AIED. We use those results to suggest two parallel strands of research that need to take place in order to impact education in the next 25 years: One is an evolutionary process, focusing on current classroom practices, collaborating with teachers, and diversifying technologies and domains. The other is a revolutionary process where we argue for embedding our technologies within students' everyday lives, supporting their cultures, practices, goals, and communities.

- ***Liza Vertinsky & Todd M. Rice, thinking about Thinking Machines: Implications for Machine Inventors For Patent Law, B. U. J SCI. & TECH L. 82 (2002), http://www.bu.edu/law/journals-archive/ scitech/ volume82/***

vertinsky&rice.pdf.

Advances in artificial intelligence, particularly in the field of evolutionary computing, are producing computers with increasingly complex problem solving capabilities. Borrowing principles of evolution, molecular biology, neurology, and human cognitive science, technologists are evolving computers into "thinking machines" with the potential to perform creative and inventive tasks. Thinking machines have already demonstrated the ability to play instrumental roles in developing patentable inventions in areas such as drug discovery, robotics, and mechanical design. As computer capabilities continue to expand and costs of computing continue to fall, machines will perform the majority of the work in the invention process and originate novel solutions not imagined by their human operators, transforming the invention process in ways not easily accommodated within the current U.S. patent system. In this paper we identify key areas of impact within the U.S. patent system and make recommendations on how to meet the challenges of a "thinking machines" paradigm of invention. The "thinking machine" paradigm is characterized by the replacement of the human with the computer as experimenter. Features of this paradigm include the automation of trial-and-error testing; the substitution of brute force computation for human intuition; the decreased cost and increased speed of producing inventions; the divisibility of the invention process into discrete abstract tasks distributed over multiple machines; and the blurring of boundaries between traditional concepts of invention, inventor, and instruments of invention. These new features will yield inventions on a scale and of a nature that the patent system is not currently equipped to accommodate at either a conceptual or practical level. Thus, the existing patent laws and supporting legal doctrine need to be re-examined, and rules for patentability, patent scope, and patent infringement adjusted, to accommodate this new paradigm of invention. This paper identifies some key issues for participants in the patent system to consider in thinking about thinking machines and the challenges these machines will pose for the patent system. We demonstrate the main areas in which the new paradigm will impact the patent system, including conceptual challenges to notions of inventor and invention, challenges in the application of statutory tests such as novelty and non-obviousness, and logistical challenges due to volume and rapid technological change. We then provide an assessment of some recent patent office initiatives and legislation targeted at addressing challenges to the patent system and some recommendations on how to adjust the patent system to accommodate the new paradigm of invention.

The changing nature of the invention process poses challenges for the players and rules that together comprise the U.S. system governing the protection of inventions (the "Patent System"). Legislators and judges must decide whether, and how, to adapt the existing statutory framework governing inventions to new technological possibilities and changing market conditions. Patent examiners and practitioners must struggle to manage a flood of potential new inventions and to apply traditional tests of patentability to a transforming invention process. Inventors and market participants seeking to use or develop related technologies must navigate cautiously through existing intellectual property boundaries.

- **Prof. Gabriel Hallevy,** ***AI v. IP- Criminal Liability for Intellectual Property IP Offenses of Artificial Intelligence AI Entities,*** **ONO ACADEMIC COLLEGE, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2691923.**

Most legal systems protect IP rights through criminal law, amongst various legal protections. This legal situation reflects the society's wide interest in protecting IP rights. When IP rights are violated, and the violation fulfils the basic requirements of the relevant offense, the society may indict the violator, regardless the violator's identity (corporation or human). But what if the violator is an AI entity?

Most modern AI entities do have the technological capability of violating IP rights. Illegal copying of software is a common example. Could the AI entity itself be criminally liable, beyond the criminal liability of the manufacturer, end-user or owner, and beyond their civil liability? The proposed research suggests the examination of a positive answer. Using the current definitions of criminal liability, the imposition of criminal liability upon AI entities for committing IP offenses is quite feasible. The proposed research suggests feasible solutions for sentencing AI entities as well.

- **Hacker, P. (2018). Teaching fairness to artificial intelligence: Existing and novel strategies against algorithmic discrimination under EU law. Common Market Law Review, 55(4), 1143-1185.**

Empirical evidence is mounting that artificial intelligence applications threaten to discriminate against legally protected groups. This raises intricate questions for EU law. The existing categories of EU anti-discrimination law do not provide an easy fit for algorithmic decision making. Furthermore, victims won't be able to prove their case without access to the data and the algorithmic models. Drawing on a growing computer

science literature on algorithmic fairness, this article suggests an integrated vision of anti-discrimination and data protection law to enforce fairness in the digital age. It shows how the concepts of anti-discrimination law may be combined with algorithmic audits and data protection impact assessments in an effort to unlock the algorithmic black box.

- **Sana Singh and Sonil Singhania, India: Redefine Intellectual Property With Artificial Intelligence, available at https://www.mondaq.com/india/patent/1036180/redefine-intellectual-property-with-artificial-intelligence.**

AI questions the most conventional Intellectual Property legal principles, such as "author", "creator", "originality", or "inventiveness". Can a machine be an author or an inventor? Should AI generated inventions be considered state of art? Who is the owner of AI generated works or inventions? Who should be held responsible for the creations and innovations generated by AI, if they encroach upon others' rights or violate other legal provisions? With the increasing prevalence, and increasing capability of AI these are some of the Intellectual Property Law issues that the legal fraternity has to resolve.This article proposes to address such issues and endeavours to provide suggestions so as to attune the law with the present developments. Traditional Copyright law does not recognize AI generated works. It only protects the original creations of a human being. In a famous Monkey-Selfie copyright dispute, U.S. Copyright Office clarified that to fall within the protective shield of copyright law a work must be created by a human being. This decision gave rise to challenges for the copyrightability of AI-generated works.

However, in United Kingdom the law is rather different. In UK Copyright Act, there is a provision which stipulates that if a work is computer-generated then the author is taken to be the person who facilitated the work to be created. On similar terms we can assume that the author of AI generated work would be one who made the arrangement necessary for the creation of work.With regard to Indian legal standards, Section 2 (d) of the Copyright Act, 1957, defines "author" "in relation to any literary, dramatic, musical or artistic work which is computer-generated, the person who causes the work to be created;" The complexity arises where AI becomes more advanced and fully autonomous and when it has the liberty to make its own decisions, it may become even more

complicated to say with certainty by whom the arrangement necessary for the creation of work undertaken. As per current scenario only the human-authors of creative works may enjoy copyright protection. However, some scholars have advocated the idea of granting copyright to non-human authors. They argue that the realm of word “authorship” should be widened to incorporate both human and non-human authors. The authorship of a work created by AI is still contentious. It is doubtless to say that to kickstart any AI based work human interventionis necessary but to determine the author/owner in a scenario where AI plays a leading role in completing the work is still under clouds. AI has the potential to challenge the core legal principles that are edifice of Patent law. Whether AI generated invention should be given protection under patent law, and if so, who should be considered as the inventor for such AI created inventions are the most fundamental questions that need to be addressed urgently. Some scholars are of the view that granting patent rights to AI-generated inventions would act as a catalyst for new and advanced innovations which would be difficult to achieve through human inventiveness solely. Others argue that granting patent protection to AI-generated inventions will raise the cost of research and development, increase the monopolies, thereby impeding innovation.

Another problem is with regard to setting the yardstick for ascertaining whether an AI generated invention is non-obvious. Determining the non-obviousness of an AI created invention is a practice full of uncertainty and complexity particularly for super intelligent AI that is capable of improving itself. As AI is permeating almost every sector and industries, deliberations on whether the present definition of a POSA (person ordinary skilled in art) is adequate for AI era or it should be redefined so as to include within its folds a person equipped with AI, assume much significance.

Another, indeterminacy in a patent law relates to the liability of AI in cases where AI is the infringer of patent rights. With the changing landscape of the technological developments, most AIs are now capable of infringing other patent claims. The liability issue raises the question of who should be held accountable for the actions of AI, whether the AI itself or the developer of AI and how the liability of AI will be assessed.

The patent related issues for AI created inventions must be decided in the background of whether the patent rights to AI-generated inventions would further the objective of patent law or whether it would prove detrimental for the human conceived inventions.

It is proposed that it is important to revisit the Intellectual Property Laws to bring them in conformity with the present technological developments which are defining the future of this world. Assigning authorship and inventorship to non-humans is a novel way to promote the growth and development of AI, which will boost the appetite of this world for more invention. However, instead of going for the complete overhaul of the rules and guidelines currently set in place, it would be feasible for the regulators to modify and restructure the present laws in order to avoid complex and lengthy process and to prevent the law from getting static.

The regulators have a big responsibility of creating a harmonious approach between the protection of rights of citizens / individuals and the need to encourage technological growth, while deciding upon the AI generated Intellectual Property issues. Granting authorship to AI could preclude works solely generated by AI from falling into the public domain and offer the developer of AI some monopoly to the resulting works. The patent laws considering AI can have profound impacts on innovation, the society and economy which make it imperative for the people associated with Intellectual Property to find ways for the patent system to encourage innovation while minimizing any adverse consequences. This revisitation to IPR laws would allow the present IP system to continue promoting "the progress of science and useful arts" without any impediments.

5. Hypothesis-

1. The degree of human involvement in AI-generated creative works positively affects their eligibility for copyright protection under existing legal frameworks
2. The autonomy of an AI system in the invention process negatively correlates with the likelihood of granting patents under current legal standards.
3. The use of AI-generated trademarks increases the complexity of resolving disputes related to originality and consumer confusion.

6. Research Questions

To achieve the above-mentioned objectives, the researcher aims to answer the following research questions: -

1. What is notion of AI from the point of Intellectual Property Rights and whether in current scenario AI is efficient to produce any creative works as described by Intellectual Property laws.

2. Whether AI-generated works should or would be protected under Intellectual Property Laws of India?
3. If, AI-generated work is so protectable then how the authorship and ownership will be determined?
4. Whether the International conventions such as Berne Convention, 1986 and TRIPS, 1995 protect AI-generated works? If yes then up to which extent?
5. Whether AI-generated works under legal and judicial framework of India has been covered properly? If not, whether there is need to alter the existing legal and judicial framework?.

7. Scope and Limitations-

IP rights derive from a vast number of different frameworks and protection regimes. This thesis aims to only examine the Indian frameworks and will restrain from examining national regimes.

Due to limited space and in order to achieve a consistent analysis, a fair selection of protection regimes will be made to illustrate the challenges on the IP system. For this reason, the regimes in focus will be copyright, trademark and patent. The emphasis of the discussion will furthermore concentrate on the two regimes, copyright and patent, since these have gained most attention in the debate.

8. Research Methodology

This study is based on Doctrinal legal research. As the main aim of the research is to identify the legal complexities and issues involving Intellectual Property Laws in the AI-generated inventions and subsequently suggesting the clarification, guidelines and legal reforms required to solve such problems, doctrinal legal research with historical research approach and comparative research approach balances perfectly the need of the research work.

The first step in this research will be to gain an understanding of the current state of law. In pursuant to this goal historical research approach will be used to attain sufficient knowledge about the exiting position before proceeding towards the ascertainment of issues. This approach will be useful where present statutory provisions or rules of law has raised meaningful quarries and it becomes necessary to explore the circumstance in which the present position has come (Kuljit Kaur, Relevance of Legal Research in the Process of Law Reforms, p. 331).

This will involve careful analysis of the relevant case laws brought under USPTO, EPO and Indian patent office along with legislations applicable to such offices. Such review of the existing cases and laws will offer an idea on how that branch of law was developed and what changes are required to tackle this new problem of AI-generated inventions under the existing system. These will often reveal the differences and inconsistencies in judicial approaches towards the particular topic that frequently lies at the heart of the legal complexity.

In addition to this, Researcher has also taken into consideration the comparative research approach. Comparative law denotes a method of study and research and not a distinct branch or department of law (H.C. Gutteridge, Comparative Law, 1946). Under this approach researcher will collects, examines and collates the motions, doctrines, rules and institutions which are found in developed legal systems (USPTO, EPO and Indian Patent Office) to note the points in which they agree or differ and seeks thereby to construct a system which shall be natural (S.R. Myneni, Legal Research Methodology, 2004, p. 189).

Comparative research approach will facilitate better understanding of the functions of the rules and principles of laws and involves the exploration of detailed knowledge of the law of other countries Accordingly, comparative legal research is beneficial in a legal development process where modification, amendment and changes to the law are required. Under its cross jurisdictional comparison of law the researcher will examine the law as it is while at the same time will provide ideas and views for future legal development (Adilah Adb Razak, Understanding Legal Research, University Putra Malaysia)

9. Expected outcome-

As we continuously grow to depend on technology and the requirement to produce faster results, we can safely say that AI is set to mark its existence in one's everyday activities. Even now, AI tools like Siri, Alexa are used as conversational bots to help generate responses as close to normal human speech as possible. With the kind of development that AI technology is undergoing right now, it can concur that AI will be omnipresent in the next 5-10 years.

With respect to IP, it is set to establish its presence in the world of IP. It will ease daily boring work when it takes up to administer roles such as IP profile management, patent

searching, and trademark clearing, patent filing, trademark filing, drafting agreements, and discovery. This will make granting patents, trademarks easier and reduce the costs required in the process. The growth of IP as a sector is proportional to that of AI. This will also encourage inventions as it will increase transparency levels, reduce costs, make fewer errors and complete the process in a hassle-free manner.

The possibility that AI will own IP in the future cannot be ruled out and countries will need to have a relook at its IP laws and include a new dimension or a market segment under its preview. However, before AI can flourish as IP owners, the law will need to redefine concepts of ownership, inventorship, and who can be granted an IP. There is also an imperative need to understand algorithms and differentiate them from the AI developers.

10. Significance of the study-

This research focuses specifically on analysing the relevant legal issues related to granting AI-derived inventions and works IPRs protection as well as discuss matters regarding ownership, inventorship and authorship in different legal systems, jurisdiction and patent offices to gain better understanding of the requirements, (law in India, USA and EU) and show the liability and responsibilities faced by the Artificial Machine when there is any infringement or violation of laws.

11. Scheme of Chapterization-

Chapter 1: Introduction

Chapter 2: Artificial Intelligence-Generated Work and Copyrightability Issues

Chapter 3: Challenges in Patent Law and AI-Originated Technologies

Chapter 4: Challenges Trademark and Trade Secret Law in AI-Generated branding

Chapter 5: Comparative Analysis in USPTO, EPO and Indian Patent Office

Chapter 6- Empirical Study of the Effectiveness of IPR Laws for AI-Originators

Chapter 7: Conclusion and Suggestions

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12. Appendixes-

Not Applicable.